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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/694,522	10/27/2003	Nobuaki Kamiyama	9319G-000583	1893
27572	7590	06/14/2006	EXAMINER	
HARNESS, DICKEY & PIERCE, P.L.C.			PHAM, HAI CHI	
P.O. BOX 828			ART UNIT	
BLOOMFIELD HILLS, MI 48303			PAPER NUMBER	
			2861	

DATE MAILED: 06/14/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary

Application No.

10/694,522

Applicant(s)

KAMIYAMA ET AL.

Examiner

Hai C. Pham

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 March 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 01/11/06.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

FINAL REJECTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takizawa et al. (U.S. 6,357,849) in view of Elgee (U.S. 6,877,838).

Takizawa et al. discloses an ink jet recording apparatus including a detection device for detecting a droplet discharged from a discharge nozzle (nozzles 720) provided in a discharge head (ink jet print head 701), comprising a light emitter (light emitter 707) for emitting a detection light, a receiver (light receiver 708) for receiving said detection light, and a moving device (print head shifting means 702 through 704) for moving said discharge head in a direction to intersect the optical path of said detection light, said moving device moving said discharge head in said direction of movement, said discharge nozzle discharging said droplets at a predetermined time interval (Figs. 3 and 22). Takizawa et al. further teaches that the light flux (730) is inclined to the nozzle alignment at an angle θ , which can extend from 0° to 180° , including a position where the light flux is orthogonal to the nozzle alignment, e.g., $\theta=90^\circ$ (col. 17, lines 15-36), and wherein the required conditions for the ink droplets to be detected by the laser beam without any pair of ink droplets ejected from adjoining

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nozzles to pass through the light flux simultaneously, are given by the following expressions (1) and (2):

$$(1) \quad \sin \theta \geq La / D \quad \text{or} \quad D \sin \theta \geq La$$

where La is the width or diameter of the laser beam, D is the pitch of the nozzles and $(D \sin \theta)$ is the distance between the discharge nozzle and the laser beam in the direction of movement of the discharge head. It is noted that the distance between the discharge nozzle and the laser beam is equal to the pitch D of the nozzles when the inclination angle of the light flux becomes $\theta=90^\circ$ (as in the case disclosed by the current Specification, where the distance between the discharge nozzles in the direction of movement of the discharge head is equal to the pitch of the nozzles). In other words, the distance $(D \sin \theta)$ is equal to or greater than the diameter of the laser beam La , which in turn is greater than the sum of half the diameter of the laser beam and half the diameter the ink droplet (Fig. 22 shows that six ink droplets are intercepted by the light beam and that half of the diameter of the laser beam is greater than half of the diameter of the ink droplet). More specifically, Takizawa et al. teaches the laser beam diameter La being set at $100 \mu\text{m}$ while the pitch D of the discharge nozzles is $140 \mu\text{m}$, and since the diameter of the ink droplet is far less than $100 \mu\text{m}$ as shown in Fig. 22, the condition established by Takizawa et al. amply satisfies the first claimed relationship.

$$(2) \quad CRV / F \leq La / \cos \theta$$

where CRV is a travel speed of the ink jet print head passing through the laser beam, F is a driving frequency of ejection of ink droplets, and (CRV / F) denotes the relative distance that said discharge head and said detection apparatus move from when a

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discharge nozzle discharges one droplet to when said discharge nozzle discharges the next droplet, and $(L_a / \cos \theta)$ the diameter of the laser beam in the direction of movement of the print head.

With regard to claim 6, Takizawa et al. discloses the ink jet recording apparatus comprising a discharge head with a plurality of discharge nozzles for discharging droplets arranged side by side in a predetermined direction (Fig. 17), and the detection device including the light emitter (707) and the light receiver (708) detecting whether said droplets are discharged from said discharge nozzles, and a control unit (system controller 54) for performing predetermined processing for said discharge head based on the detection result of said detection device.

However, Takizawa et al. fails to teach the discharge nozzles being aligned in the direction parallel to the direction of the movement of the discharge head.

Elgee discloses a detection of in-flight positions of the ink droplets, wherein the discharge nozzle arrangement is in the y-direction parallel to the relative movement between the print head (30) and the detection mechanism (20) (col. 6, lines 21-33) (figs. 4-5).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to modify the device of Takizawa et al. to set the relative movement of the print head and the detection mechanism such that the alignment direction of the nozzle array is parallel to the relative movement direction as taught by Elgee. The motivation for doing so would have been to allow plural droplet positions along the movement direction to be detected.

Takizawa et al. further teaches:

- wherein in a case where the diameter of the beam of said detection light is greater than the diameter of a measurement region of said receiver, D is the diameter of said measurement region (La being the width of light flux 730),
- a control device (controller 54) for resetting at least one of the values of said D, d and H (col. 18, lines 13-23),
- wherein the number of said discharge nozzles can be optionally set (e.g., in one of the embodiment, the number of nozzles to be inspected being grouped to include three nozzles in every other nozzle array) (col. 16, lines 37-60),
- an ink jet recording apparatus including the droplet discharge apparatus.

The method claims 5 and 8 are deemed to be clearly anticipated by functions of the above structures.

Response to Arguments

3. Applicant's arguments filed 03/24/06 have been fully considered but they are not persuasive.

Applicants argued that Takizawa et al.'s "Fig. 22 is disclosed with reference to a third embodiment" and that "Takizawa et al. is silent with regard to the values of the diameter of the laser beam, the size of the ink droplets, and the distance between the nozzles of the third embodiment". It is noted that Fig. 22 of Takizawa et al. describes the principle of inspection for drop dropout, which is unanimously based on the conditions as set forth by the expressions as shown at col. 9:

$$\sin \theta \geq La/D \quad \text{and} \quad CRV/F \leq La/\cos \theta$$

And that Fig. 22 shows the diameter La of the laser beam encompassing a plurality of ink droplets. Based on such relationships, the diameter La of the laser beam is found conform to the claimed condition, namely $D/2 + d/2 \leq La$ (please refer to paragraph 2 above).

Applicants further argued that since Takizawa et al. states that “all nozzles included in one specific nozzle array *to successively eject ink droplets* in the inspection”, Takizawa et al. thus not disclose feature c of the claimed limitations, namely “the discharge nozzles discharge the droplets at a same time and at a predetermined interval”. The examiner respectfully disagrees. The above-mentioned phrase “to successively eject ink droplets” should be understood that all the discharge nozzles included in one specific nozzle array are configured to continuously eject ink droplets in the inspection” (see Takizawa et al. col. 15, line 59 through col. 16, line 8). In other words, Takizawa et al. teaches that all the discharge nozzles included in one specific nozzle array are configured to simultaneously eject ink droplets during the inspection period.

Conclusion

4. Applicant's amendment, which changed the scope of each of the base claims, necessitated the new grounds of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hai C. Pham whose telephone number is (571) 272-2260. The examiner can normally be reached on M-F 8:30AM - 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vip Patel can be reached on (571) 272-2458. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



HAI PHAM
PRIMARY EXAMINER

June 9, 2006